FORM PTO-1390 U S DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371

ATTORNEY'S DOCKET NUMBER	U S. APPLICATION NO (If known, see 37 CFR 1 5)
4139-121	09/890840

INTERNATIONAL APPLICATION NO.	INTERNATIONAL FILING DATE	PRIORITY DATE CLAIMED
PCT/DE00/00347	7 February 2000	6 February 1999

TITLE OF INVENTION

CONTOUR COLLIMATOR FOR USE IN RADIOTHERAPY

APPLICANT(S) FOR DO/EO/US

Wolfgand Schlegel, Otto Pastyr, Gernot Echner, Karl-Heinz Hover and Jurgen Richter

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information.

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☐ This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).
4. ☒ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.

5. ☒ A copy of the International Application as filed (35 U.S.C. 371(c)(2))
   a. ☒ is transmitted herewith (required only if not transmitted by the International Bureau).
   b. ☒ has been transmitted by the International Bureau.
   c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).

6. ☒ A translation of the International Application into English (35 U.S.C. 371(c)(2)).

7. ☐ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))
   a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
   b. ☐ have been transmitted by the International Bureau.
   c. ☐ have not been made; however, the time limit for making such amendments has NOT expired
   d. ☒ have not been made and will not be made.

8. ☐ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).

9. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).*(**Unsigned**)

10. ☐ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11. to 16. below concern other document(s) or information included:

11. ☐ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.

12. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.

13. ☒ A FIRST preliminary amendment.
    ☐ A SECOND or SUBSEQUENT preliminary amendment.

14. ☐ A substitute specification.

15. ☒ A small entity statement.

16. ☒ Other items or information: EPO Search Report in German, International Preliminary Examination Report under PCT Article 36

NOTE: This application is being filed with an unsigned Oath or Declaration under the provisions of 37 CFR § 1.53 in order that applicant may secure a filing date of August 3, 2001. Upon receipt of a "Notice to File Missing Parts - Filing Date Granted," a executed Declaration and Power of Attorney will be forwarded. The undersigned agent affirmatively states that she has been duly authorized and appointed to file this application on behalf of the applicant and applicant's assignee, and that the Declaration and Power of Attorney to be filed hereafter will confirm the undersigned agent's authorization and appointment. Applicants are considered a small entity and assignee Deutsches Krebsforschungszentrum is also considered a small entity within the meaning of 37 CFR § 1.9.

09/890840

JC05 Rec'd PCT/PTO 0 3 AUG 2001

17. ☒ The following fees are submitted:	CALCULATIONS	PTO USE ONLY
Basic National Fee (37 CFR 1.492(a)(1)-(5)): Search Report has been prepared by the EPO or JPO $860.00		
International preliminary examination fee paid to USPTO (37 CFR 1.482) $0.00		
No International preliminary examination fee paid to USPTO (37 CFR 1.482) but international search fee paid to USPTO (37 CFR 1.445(a)(2)) $0.00		
Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO $1000.00		
International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(2)-(4) $0.00		
ENTER APPROPRIATE BASIC FEE AMOUNT =	$ 860.00	
Surcharge of **$130.00** for furnishing the oath or declaration later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492(e)).	$	

Claims	Number Filed	Number Extra	Rate		
Total Claims	12-20 =	0	X **$18.00**	$	
Independent Claims	1- 3 =	0	X **$80.00**	$	
Multiple dependent claim(s) (if applicable)			+ **$270.00**	$	
TOTAL OF ABOVE CALCULATIONS =				860.00	
Reduction by 1/2 for filing by small entity, if applicable. Verified Small Entity statement must also be filed. (Note 37 CFR 1.9, 1.27, 1.28).				$ 430.00	
SUBTOTAL =				$ 430.00	
Processing fee of **$130.00** for furnishing the English translation later than ☐ 20 ☐ 30 Months from the earliest claimed priority date (37 CFR 1.492(f)). +				$	
TOTAL NATIONAL FEE =				$ 430.00	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). **$40.00** per property +				$	
TOTAL FEE ENCLOSED =				$ 430.00	
				Amount to be: refunded	$
				Charged	$

a. ☒ A check in the amount of $430.00 to cover the above fees is enclosed.

b. ☐ Please charge my Deposit Account No. _____ in the amount of $_____ to cover the above fees. A duplicate copy of this sheet is enclosed.

c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 08-3284. A duplicate copy of this sheet is enclosed.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not yet been met, a petition to revive (37 CFR 1.127(a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

Steven J. Hultquist
Intellectual Property/Technology Law
P. O. Box 14329
Research Triangle Park, NC 27709

MARIANNE FUIERER
Registration No. 39,983

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	**SCHLEGEL, et al.**
Application No.:	New U.S. National Stage Application of PCT International Application No. PCT/DE00/00347
International Filing Date:	7 February 2000
Priority Date Claimed:	6 February 1999 (German Appl. No. 199 04 972.6)
U.S. National Phase Filing Date:	Date of mailing identified below
Title:	**CONTOUR COLLIMATOR FOR USE IN RADIOTHERAPY**

EXPRESS MAIL CERTIFICATE

I hereby certify that I am mailing the attached documents to the Commissioner for Patents on the date specified, in an envelope addressed to the Commissioner for Patents, Box Patent Application, Washington, DC 20231, and Express Mailed under the provisions of 37 CFR 1 10

Lee Ann Brown
Name of Person Mailing This Document

Lee Ann Brown
Signature

August 3, 2001
Date

EL831358316US
Express Mail Label Number

PRELIMINARY AMENDMENT

Commissioner for Patents
BOX PATENT APPLICATION
Washington, D.C. 20231

Sir:

Prior to examination of the above-identified new national phase patent application, please amend the application, as follows:

In the Claims

Please amend claims 1-10 to read as follows:

1. A contour collimator for radiation therapy comprising a plurality of diaphragm elements having two sides and a first and second terminal portion wherein the diaphragm elements are arranged in a fan formation and are arranged movably with respect to each other, such movement being powered by a drive unit for each diaphragm element; and wherein the diaphragm elements are supported only on the first terminal portion of the diaphragm element that is positioned near the drive unit.

2. The contour collimator according to claim 1, wherein the first terminal portion of the diaphragm elements are furnished with a toothed rack communicatively connected to the drive unit.

3. The contour collimator according to claim 2, further comprising a guide for the diaphragm elements that is disposed directly adjacent to the drive unit.

4. The contour collimator according to claim 3 further comprising a loose bedding that is provided for diaphragm elements on the second terminal portion of the diaphragm elements opposite to drive unit.

5. The contour collimator according to claim 1, wherein at least two diaphragm elements are arranged with some separation, opposite and slightly offset relative to one another, and movably towards one another in more than half the distance of separation.

6. The contour collimator according to claim 1, wherein the longitudinal axes of least two diaphragm elements form an angle over the distance from the drive unit to their facing side.

7. The contour collimator according to claim 3, wherein the first terminal portion of a diaphragm element in the area of the drive unit in the direction of movement of the diaphragm element is longer than its opposite side.

8. The contour collimator according to claim1, wherein at least two diaphragm elements form a diaphragm group which is arranged movably in the direction of movement of the diaphragm elements in addition to the movement of individual diaphragm elements.

9. The contour collimator according to claim 8, wherein two diaphragm groups are arranged opposite one another in the direction of movement of the diaphragm elements and movably towards one another on guide rails.

10. The contour collimator according to claim 1, wherein the drive unit is equipped with a rotary potentiometer to record the position of the diaphragms.

Please add new claims 11 and 12

11. The contour collimator according to claim 1, wherein the drive units are arranged parallel to each other.

12. The contour collimator according to claim 2, wherein the toothed rack operates in conjunction with the drive unit comprising a gear wheel driven perpendicularly to the direction of movement of the diaphragms.

REMARK

A marked-up version of amended paragraph in the specification and amended claims 1-10 are included herewith in Appendix A.

It is requested that the examination and prosecution of this application proceed on the basis of the English translation of the PCT International application included herewith and these amended claims 1-10.

Respectfully submitted,

Marianne Fuierer
Registration No. 39,983
Attorney for Applicants

**INTELLECTUAL PROPERTY/
TECHNOLOGY LAW
P. O. Box 14329
Research Triangle Park, NC 27709
Phone: (919) 419-9350
Fax: (919) 419-9354
Attorney File: 4139-121**

APPENDIX A

In the Claims

Please amend claims 1-10 to read as follows:

1. A contour collimator [(1)] for radiation therapy comprising [having] a plurality of diaphragm elements having two sides and a first and second terminal portion [(13, 14)] wherein the diaphragm elements are arranged in a fan formation and are arranged movably with respect to each other, such movement being powered by a drive unit for each diaphragm element; [(17, 17')], [characterized in that] and wherein the diaphragm elements [(13, 14)] are supported only on the first terminal portion [on the side of] of the diaphragm element that is positioned near the drive unit [(17, 17')].

2. The contour collimator according to claim 1, wherein the [characterized in that] first terminal portion of the diaphragm elements [(13, 14)] are furnished with a toothed rack [(33)] communicatively connected to the [in the area of] drive unit [(17, 17')].

3. The contour collimator according to claim 2, [either of the previous claims, characterized in that] further comprising a guide for the diaphragm elements [(13, 14)] that is disposed directly adjacent to the drive unit [(17, 17')].

4. The contour collimator according to claim 3 [any of the previous claims, characterized in that] further comprising a loose bedding [(30, 30')] that is provided for diaphragm elements [(13, 14)] on the second terminal portion [side] of the diaphragm elements [(13, 14)] opposite to drive unit [(17, 17')].

5. The contour collimator according to claim 1, wherein [any of the previous claims, characterized in that] at least two diaphragm elements [(13, 14)] are arranged with some separation, opposite and slightly offset relative to one

another, and movably towards one another in more than half the distance of separation.

6. The contour collimator according to claim 1, wherein [any of the previous claims, characterized in that] the longitudinal axes of least two diaphragm elements [(13, 14)] form an angle over the distance from the drive unit [(17, 17')] to their facing side.

7. The contour collimator according to claim 3, wherein [any of the previous claims, characterized in that the side] the first terminal portion of a diaphragm element [(13, 14)] in the area of the drive unit [(17, 17')] in the direction of movement [(34)] of the diaphragm element [(13, 14)] is longer than its opposite side.

8. The contour collimator according to claim1, wherein [any of the previous claims, characterized in that] at least two diaphragm elements [(13, 14)] form a diaphragm group [(2, 3)] which is arranged movably in the direction of movement of the diaphragm elements [(13, 14)] in addition to the movement of individual diaphragm elements [(13, 14)].

9. The contour collimator according to claim 8, wherein [characterized in that] two diaphragm groups [(2, 3)] are arranged opposite one another in the direction of movement [(34)] of the diaphragm elements [(13, 14)] and movably towards one another on guide rails [(4, 5, 6, 7)].

10. The contour collimator according to claim 1, wherein [any of the previous claims, characterized in that] the drive unit [(17, 17')] is equipped with a rotary potentiometer [(28)] to record the position of the diaphragms.

CONTOUR COLLIMATOR FOR RADIATION THERAPY

The invention relates to a contour collimator for radiation therapy having a plurality of diaphragm elements arranged movably with respect to each other, such movement being powered by a drive unit.

A contour collimator of this kind is known for example from DE 195 36 804.5 A1. In the contour collimator described therein, a drive unit is provided for each of the plurality of diaphragm elements, and the drive units move the diaphragm elements in two directions along a guide rail. By means of the control for each individual diaphragm element, a radiation field is set up with which it is possible to create a special contour for radiation on the body part that is being radiated. This contour collimator is especially suitable for small radiation fields. It is impossible to increase the size of this known contour collimator in order to create larger radiation fields because the motors such an increase in size would necessitate are too big and they can scarcely be arranged about the radiation field.

The task of the present invention was therefore to adapt a known contour collimator in such a way that it is also suited for use with larger radiation fields.

This task has been solved by supporting the diaphragm elements only on the side of the drive unit.

The invention is based on the premise that the diaphragm elements must be both supported and movable. In the known contour collimator, this facility is provided in the form of a rail that supports the weight of the diaphragm elements and guides them in courses parallel to one another.

However, particularly when larger diaphragm elements are used, a high degree of friction is generated in the guide rails, the diaphragm elements tend to jam, and they cannot be moved without the application of much power. The use of larger motors leads to increased size of the contour collimator, an undesirable and unacceptable increase in weight and, most importantly, to space problems since the motors should be arranged as closely as possible to the diaphragm elements.

However, the diaphragm elements of the contour collimator according to the invention are preferably only supported in the area of the drive unit by means of a fixed bearing. The additional guides that are necessary for the diaphragm elements are for positioning purposes only and do not support any of the elements' weight. Jamming is prevented by the proximity of the support to the drive unit, and lower forces are required to move the diaphragm elements. Consequently, the motors can be smaller and can be arranged beside one another in very limited space.

One particularly advantageous embodiment provides for a toothed rack on the diaphragm elements in the area of the drive unit. This toothed rack allows, for example, allows it to operate in conjunction with a gearwheel driven perpendicularly to the direction of movement of the diaphragms,

thus achieving a transmission of power with minimal loss. The toothed rack also contributes to a highly compact construction of the contour collimator, since it allows the drive units to be arranged very closely together.

It is further advantageous if a guide for the diaphragm elements is also arranged in direct proximity to the drive unit. The guide in the area of the drive unit ensures reliable cooperation between drive unit and diaphragm element, and particularly when toothed rack and gearwheel cooperate, the guide ensures that the elements remain securely positioned relative to each other.

In order to ensure that the movement of the diaphragm elements generates as little friction as possible, it is proposed to provide a loose bedding for the diaphragm elements on the side of the elements that faces the drive unit. This loose bedding absorbs only minimal lateral weight in a plane perpendicular to the direction of movement of the diaphragms and its primary function is to ensure that the diaphragm elements are guided essentially parallel to each other.

In a preferred configuration, at least two diaphragm elements are arranged with some separation, opposite and slightly offset relative one another, and movably towards one another in more than half the distance of separation. This arrangement provides the capability of "over travel", which allows the formation of special contours and the interlacing of oppositely arranged diaphragm elements.

In order to adjust the contour collimator optimally to the beam path of the radiation beam, it is proposed that the longitudinal axes of at least two diaphragm elements form an angle over the distance from the drive unit to their facing side. In this way, the diaphragm elements can be constructed conically and arranged in a fan formation, with the fan broadening in the direction of the beams being used.

It is advantageous if at least two diaphragm elements have the same length over the distance from the drive unit to their facing side. Indeed, all diaphragm elements preferably have essentially the same shape, in order to reduce the costs of manufacturing the diaphragm elements and to facilitate replacement of faulty diaphragm elements.

A significant reduction in the weight of the diaphragm elements can be achieved if the side of the diaphragm element in the area of the drive units in the direction of movement of the diaphragm elements is longer than its opposite side. Whereas the drive unit cooperates with the diaphragm element on its longer side, the diaphragm element only reaches its full height in the area in which it comes into contact with the radiation.

The collimator can be adjusted rapidly to the most varied operating requirements if at least two and preferably half of the diaphragm elements form a diaphragm group, which is disposed movably in the direction of movement of the diaphragm elements in addition to the movement of the individual diaphragm elements. In this way, the diaphragm group can be

simply displaced as a whole, thereby enabling the radiation field to be rapidly enlarged or reduced.

This is preferably achieved by arranging two diaphragm groups opposite one another in the direction of movement of the diaphragms and movably towards one another on guide rails. For example, the contour collimator can then be operated with a high degree of overtravel with closely adjacent diaphragm groups. On the other hand, diaphragm groups having a large separation distance allow the formation of a particularly large and contoured radiated area.

A highly compact configuration of the contour collimator can be achieved if the drive unit is equipped with an axle disposed perpendicularly to the diaphragm element and connected to a motor. In this way, it is possible to provide many closely arranged motors to drive many diaphragm elements. Not only does this result in a particularly compact configuration, but the closely arranged motors can also be controlled easily, and are easily replaced in case of damage.

The design according to the invention particularly allows one drive unit to be assigned to each diaphragm element, so that it is possible to configure the position of the diaphragm elements on an individual basis.

In order to transfer the position of the diaphragm elements to a data processing system for purposes of monitoring and documentation, it is proposed that each drive unit be equipped with a rotary potentiometer,

attached with minimal space requirement, or with a linear potentiometer arranged parallel to the diaphragm elements, or with other measuring systems such as inductive or optical systems.

A preferred embodiment of a contour collimator according to the invention is illustrated in the drawing and will be described in detail with reference to the following figures, wherein:

Figure 1 is a three-dimensional view of the contour collimator, diaphragm elements included for exemplary purposes,

Figure 2 is a schematic view of the contour collimator of figure 1, seen from the front,

Figure 3 is an enlarged section of figure 2,

Figure 4 is a schematic top view of the contour collimator of figure 1,

Figure 5 is a view of a drive unit and

Figure 6 is an enlarged detail of figure 3,

Figure 7 is a guide plate for the diaphragm elements,

Figure 8 is an alternative embodiment of a guide plate with diaphragm elements attached, and

Figure 9 is an enlarged section of figure 8 showing only one diaphragm element.

The contour collimator 1 illustrated in figure 1 consists of one right-disposed lamella set 2 and one left-disposed lamella set 3, that are arranged movably with respect to one another on four bracing members 4, 5, 6, 7.

Each set of lamella includes a front plate 8 and a rear plate 9 which are kept at distance from one another by duct spacers 10, 11, 12. The plates are equipped with devices for supporting and guiding lamella members 13, 14. Duct spacers 10, 11, 12 are arranged perpendicularly to the plates and have boreholes 15 and grooves 16 for securing drive units 17 to the lamella set.

Bracing members 4 to 7 supporting lamella sets 2, 3 are attached to bored rods 18, 19, 20, 21, and these rods serve to urge the entire contour collimator 1 towards a plate that is movably attached to a radiation device, which is not illustrated.

For ease of understanding, only one hanging 13 and one standing 14 diaphragm element are shown in figure 1, with one drive unit 17. However, the contour collimator is equipped with a multiplicity of diaphragm elements arranged parallel to each other, each of which is connected to its own drive unit 17.

The arrangement of multiple diaphragm elements can be seen in figure 2, in which all diaphragm elements are illustrated.

The diaphragm elements are arranged in a slightly semicircular configuration and to save space every second element is driven from above, while those between are driven from below.

For driving the diaphragm elements, one drive unit 17 is provided to drive each element 13. This drive unit consists of a motor 22, a linkage 23 and a driving gearwheel 24. Linkage 23 and gearwheel 24 are connected by a shaft 25, on which gearwheel 26 is arranged to cooperate with a gearwheel 27 and displaces a rotary potentiometer 28 in correspondence with the position of lamella 13. The adjacent diaphragm element 14 is driven by a driving gearwheel 24', which is disposed below it and is equipped with a corresponding drive unit 17'. Drive units 17 and 17' are secured to spacers 10 and 11, 11', and these spacers are in turn attached to bracing members 4 to 7 by means of plates 8 and 9.

The suspension of a diaphragm element is illustrated more clearly in figure 3. The entire weight of diaphragm element 13 rests on spacer 29, which is arranged directly opposite drive wheel 24. The remaining areas of plate 9 that contact diaphragm element 13 serve solely for guidance, to ensure that diaphragm element 13 does not slip off of bearing surface 29. However, the guidance surfaces formed between diaphragm element 13 and plate 9 cooperate with a loose bedding 30 on the facing plate extremity. A groove 31 is milled into diaphragm element 13 to engage with this loose bedding 30, which receives a retaining pin 32 on plate 9.

The adjacent diaphragm element 14 has a bearing surface 29' that is arranged facing drive gearwheel 24' and supports the weight of the plate. Diaphragm element 14 is seated correspondingly in a loose bedding 30' facing drive gearwheel 24'.

When, for example, drive gearwheel 24 is driven by toothed rack 33, diaphragm element 13 is displaced. To reduce friction to a minimum, diaphragm element 13 slides over bearing surface 29 and is also guided by oppositely positioned loose bedding 30. Correspondingly, diaphragm element 14 does not rest on drive gearwheel 24, but on bearing surface 29', while spatial guidance is the function of loose bedding 30'.

The schematic top view of contour collimator 1 view shown in figure 4 shows diaphragm element 13 only for the purpose of indicating its movable arrangement in the direction of arrow 34. Diaphragm element 13 is driven by drive unit 17, which - like the other drive units - receives its power through power cables 35, 36. Diaphragm element 13 is a diaphragm element in the lamella set on the left side 3, which is movably disposed on bracing members 4 and 6 and bracing members 5 and 7 (not shown in figure 5) arranged below them. Lamella set 3 is also displaceable in the direction of arrow 34, and the range of displacement is delimited by external stops 37, 38, and by the rods 18 and 20. Lamella sets 2 and 3 are moved by means of a handwheel 39, with which the lamella sets 2 and 3 can be moved towards and away from each other symmetrically about a center line. Alternatively, the lamella sets 2 and 3 can be driven jointly or separately by means of one or two drive units.

Figure 5 presents a further, three-dimensional view of a drive unit 17. Motor 22 is arranged on a linkage 23 which drives a drive gearwheel 24 through shaft 25. Another gearwheel 26 is also secured to shaft 25, and

cooperates with gearwheel 27. Gearwheel 27 in turn acts on a rotary potentiometer 28 through a shaft 40. The rotary potentiometer 28 passes an analog value to a control unit (not shown), which emulates the position of lamella 13 in the contour collimator.

A resolver can also be disposed instead of rotary potentiometer 28. Such a device emits a preset number of pulses for each revolution, thus passing a digital indication of the lamella position value to the controlling device.

Figure 6 shows an enlarged illustration of the bottom guide of diaphragm element 14. While diaphragm element 14 is supported on surface 29', contact surfaces 40, 41 and 42 serve for guidance and combine with surface 29' to form a fixed bearing.

Guide plate 50, which is illustrated in figure 7, clearly shows the specialized shape of notches 51, 52 and their respectively opposed pins 53, 54. This neat arrangement of notches 51, 52 that also serve as bracing points and pins 53, 54 that also serve as loose bedding allows for highly precise positioning of the diaphragm elements. The guide plate is manufactured by wire EDM. This process is inexpensive, fast, and above all extremely accurate.

The principle of the invention is not limited to the embodiment that has been described up to this point. It may be implemented in many different ways. Therefore, the embodiment in figure 8 is to be understood as purely exemplary in nature, wherein guide plate 60 is furnished with round

notches 61, 62. These round notches 61, 62 serve as bracing points and cooperate with the opposing grooves 63, 64, which serve as a loose bedding.

The section in figure 9 illustrates more clearly the way in which a diaphragm element 65 is arranged between a bracing point 61 and a loose bedding 63. Accordingly, diaphragm element 65 displays an rounded extension 67 at one end and a spring extension 69 at the other end 68. The rounded extension 67 is supported in rounded notch 61 and on this side it engages with the drive unit (not shown). Spring extension 69 is seated in groove 64, which is larger than the extension to compensate for longitudinal deviations. This embodiment can also be manufactured easily by wire EDM.

CLAIMS

1. A contour collimator (1) for radiation therapy having a plurality of diaphragm elements (13, 14) arranged movably with respect to each other, such movement being powered by a drive unit (17, 17'), characterized in that the diaphragm elements (13, 14) are supported only on the side of the drive unit (17, 17').

2. The contour collimator according to claim 1, characterized in that diaphragm elements (13, 14) are furnished with a toothed rack (33) in the area of drive unit (17, 17').

3. The contour collimator according to either of the previous claims, characterized in that a guide for the diaphragm elements (13, 14) is disposed directly adjacent to the drive unit (17, 17').

4. The contour collimator according to any of the previous claims, characterized in that a loose bedding (30, 30') is provided for diaphragm elements (13, 14) on the side of the diaphragm elements (13, 14) opposite to drive unit (17, 17').

5. The contour collimator according to any of the previous claims, characterized in that at least two diaphragm elements (13, 14) arranged with some separation, opposite and slightly offset relative one another, and movably towards one another in more than half the distance of separation.

6. The contour collimator according to any of the previous claims, characterized in that the longitudinal axes of least two diaphragm elements (13, 14) form an angle over the distance from the drive unit (17, 17') to their facing side.

7. The contour collimator according to any of the previous claims, characterized in that the side of a diaphragm element (13, 14) in the area of the drive unit (17, 17') in the direction of movement (34) of the diaphragm element (13, 14) is longer than its opposite side.

8. The contour collimator according to any of the previous claims, characterized in that at least two diaphragm elements (13, 14) form a diaphragm group (2, 3) which is arranged movably in the direction of movement of the diaphragm elements (13, 14) in addition to the movement of individual diaphragm elements (13, 14).

9. The contour collimator according to claim 8, characterized in that two diaphragm groups (2, 3) are arranged opposite one another in the direction of movement (34) of the diaphragm elements (13, 14) and movably towards one another on guide rails (4, 5, 6, 7).

10. The contour collimator according to any of the previous claims, characterized in that drive unit (17, 17') is equipped with a rotary potentiometer (28) to record the position of the diaphragms.

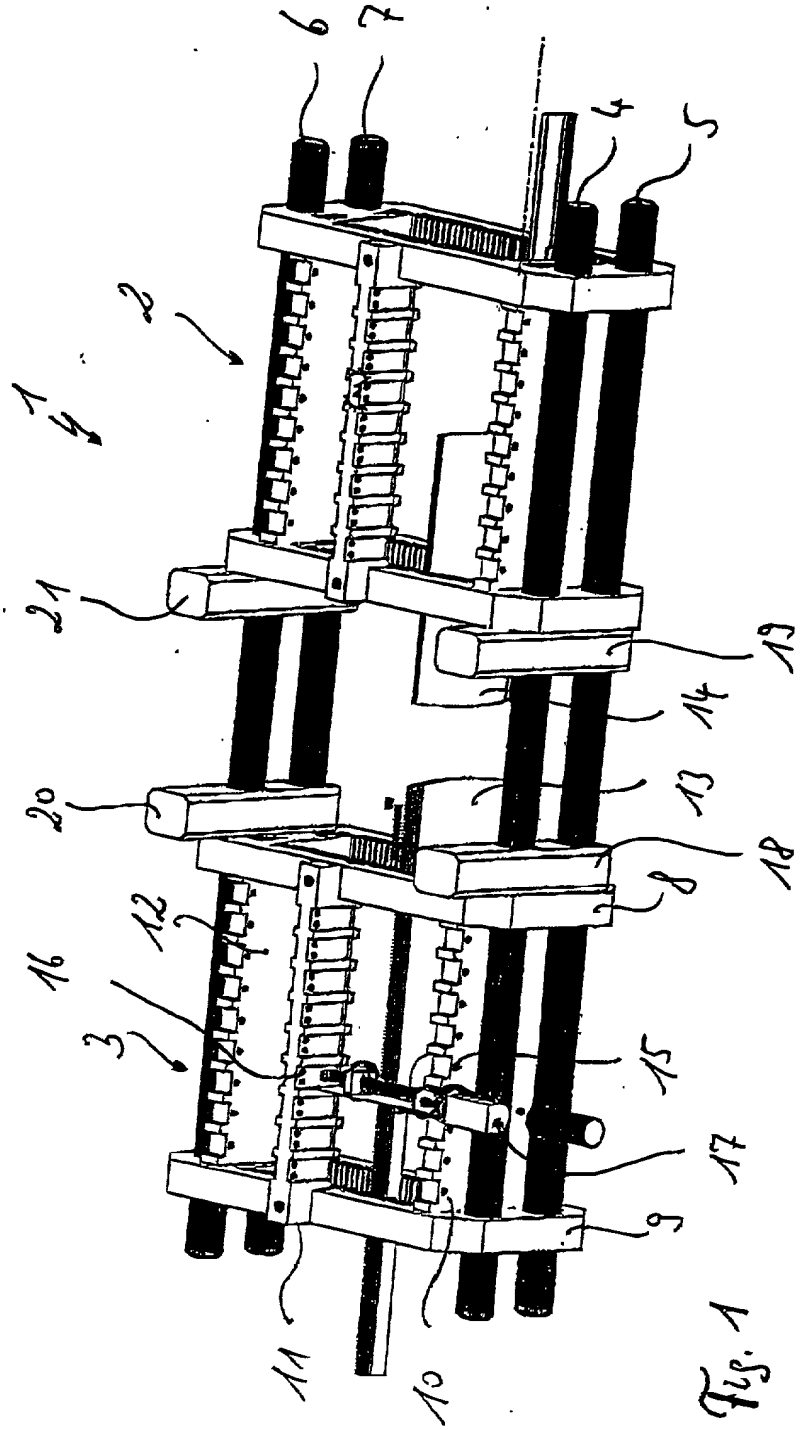

Fig. 1

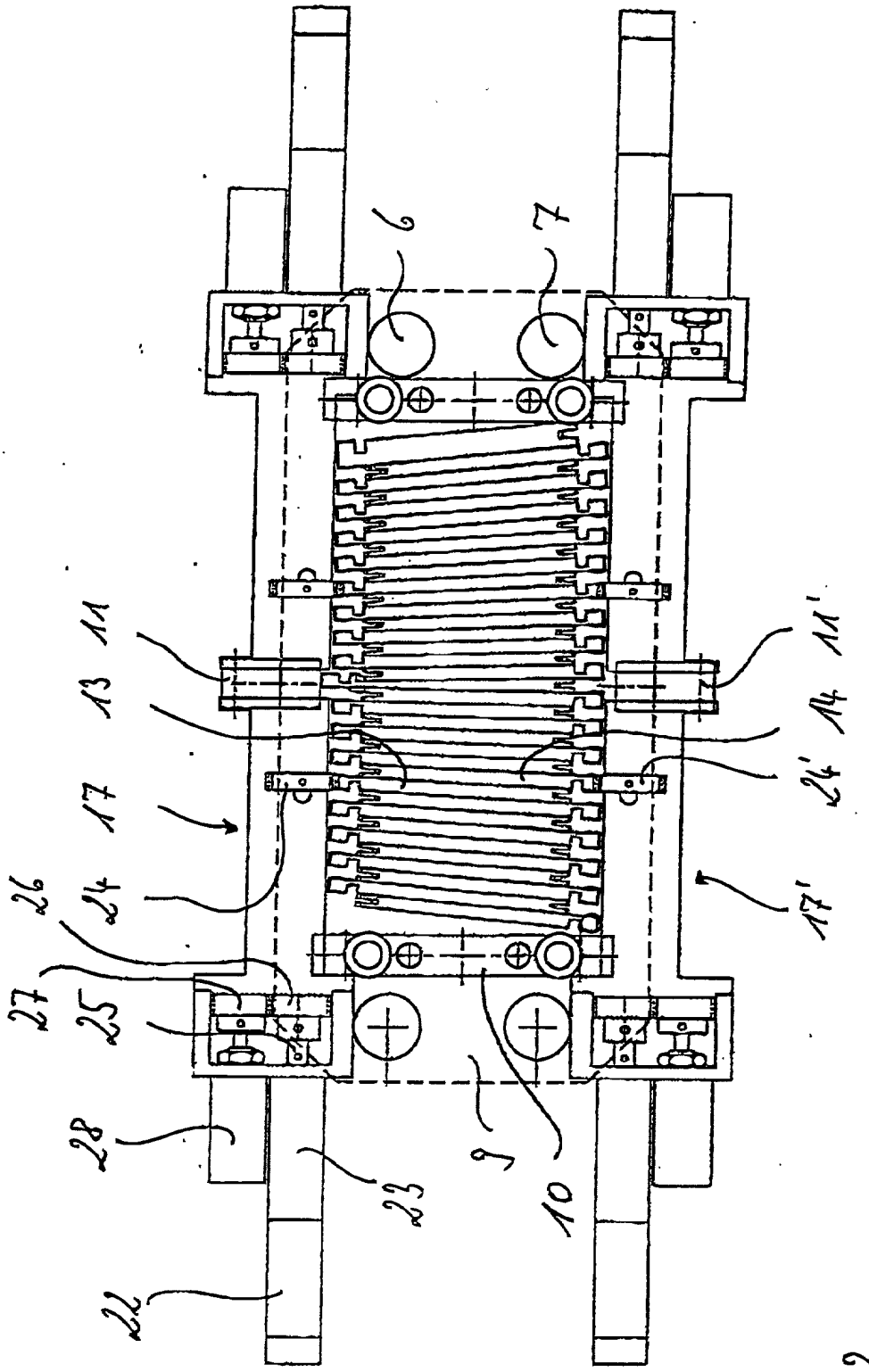

Fig. 2

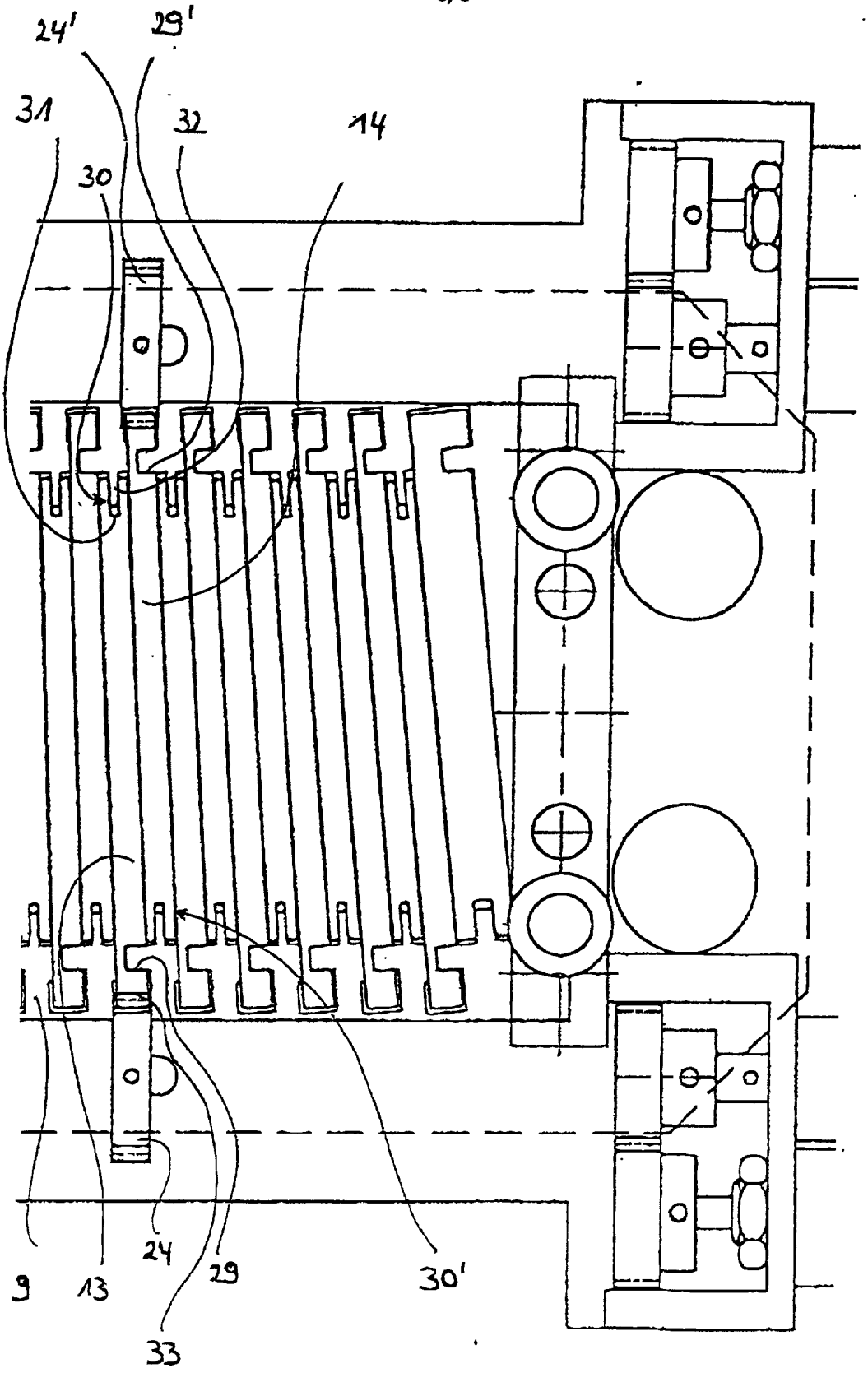

Fig. 3

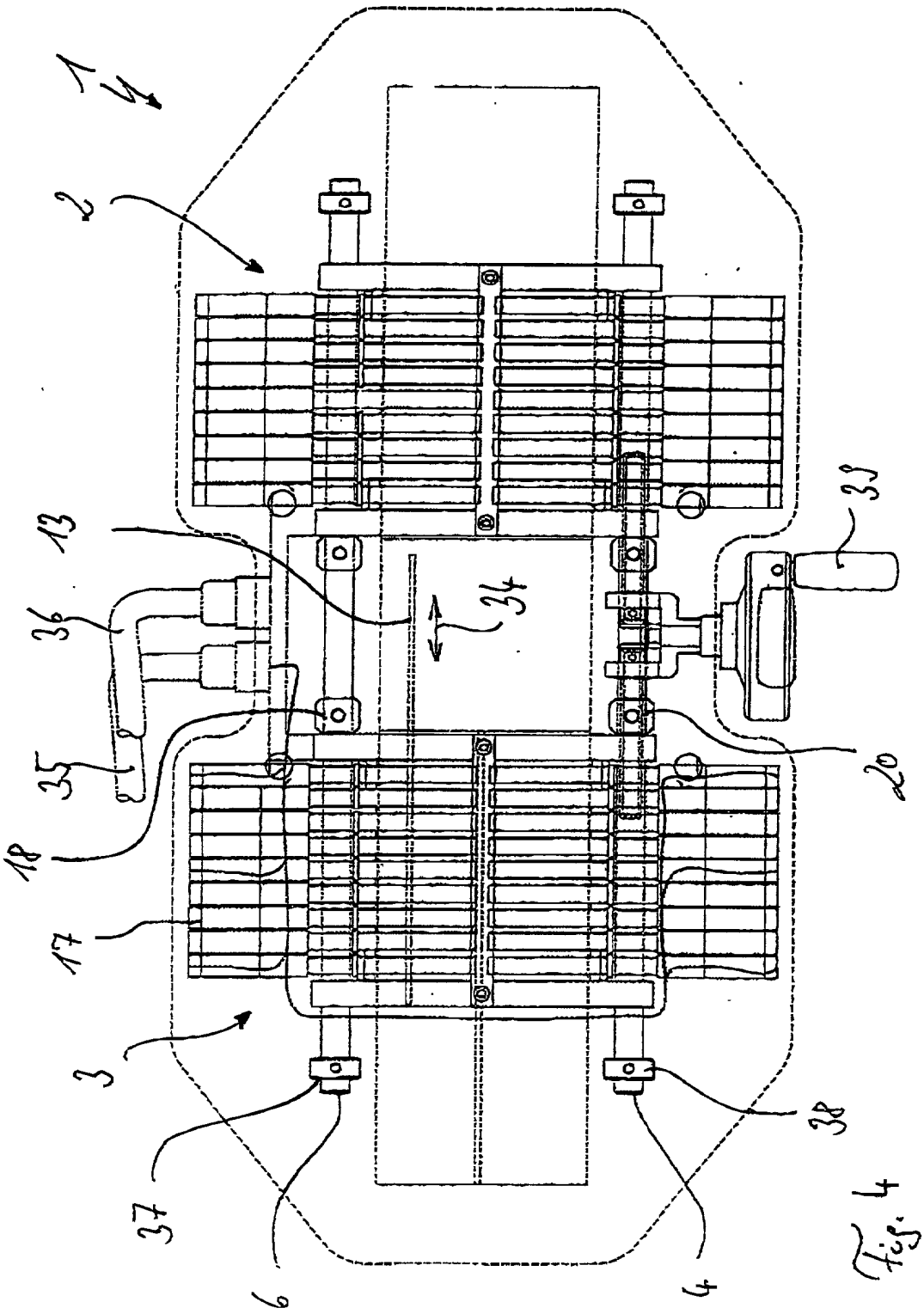

Fig. 4

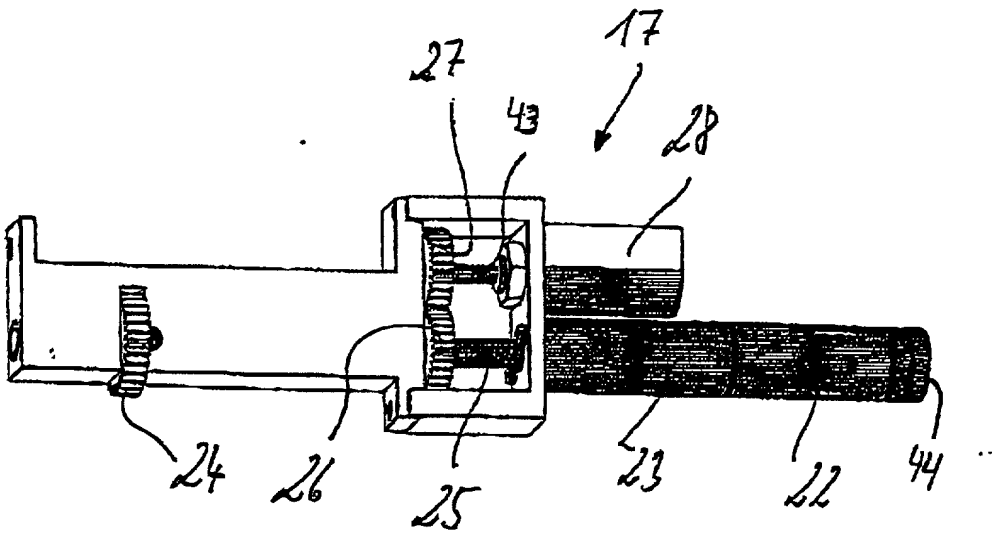

Fig. 5

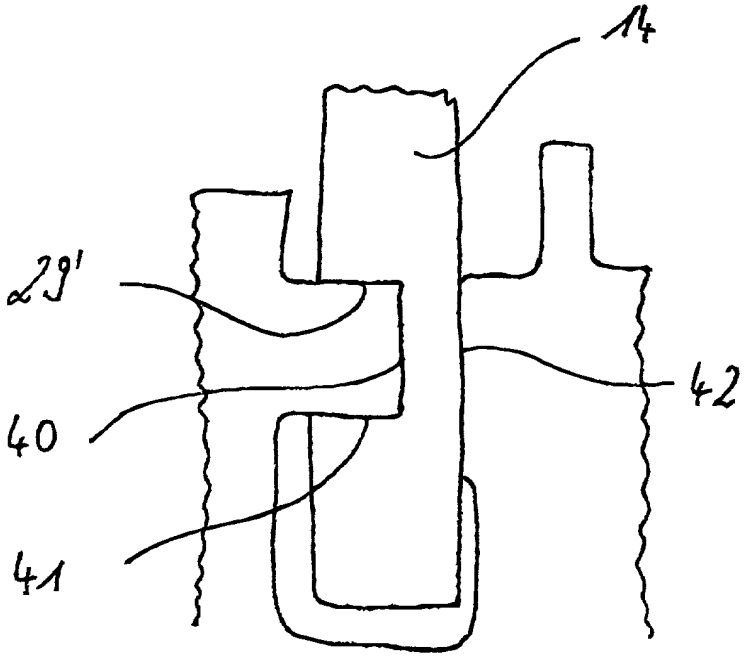

Fig. 6

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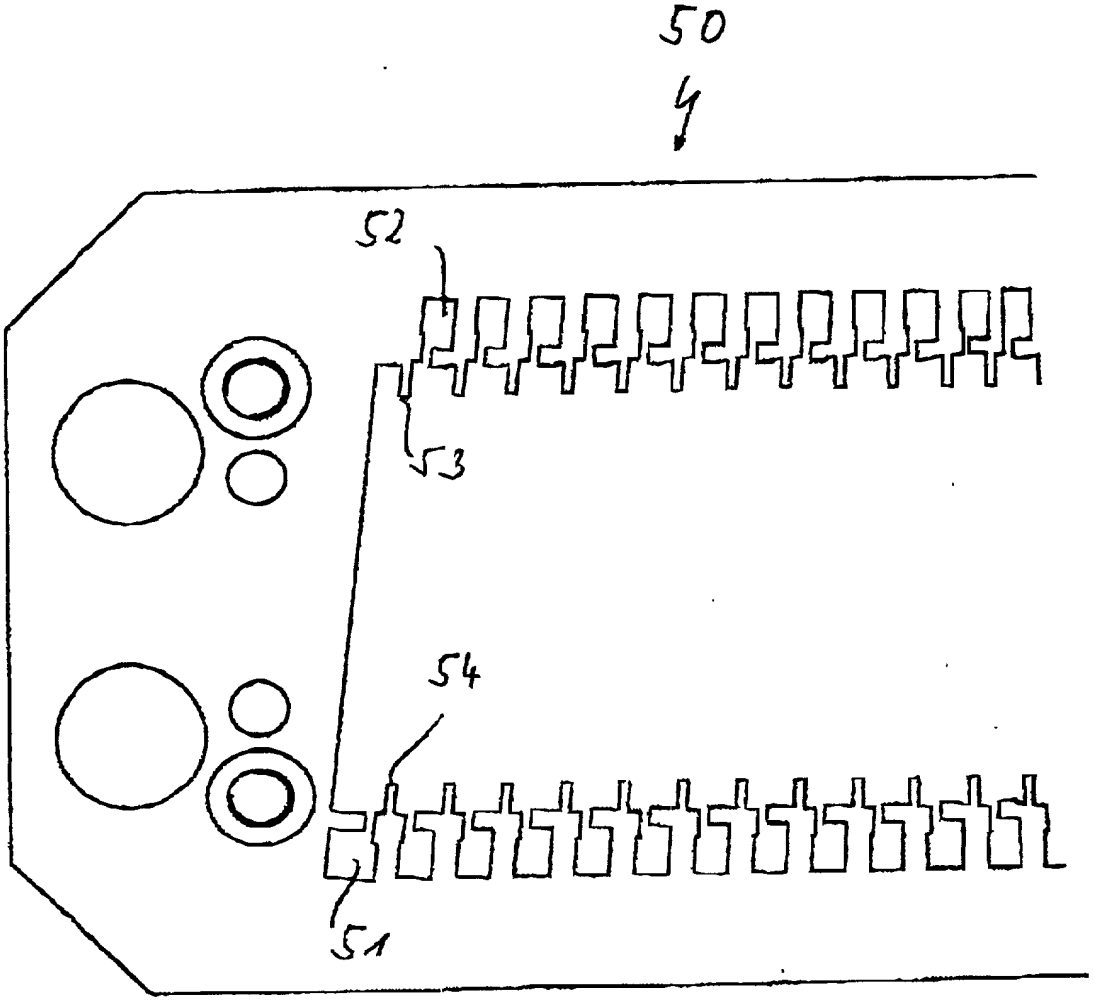

Fig. 7

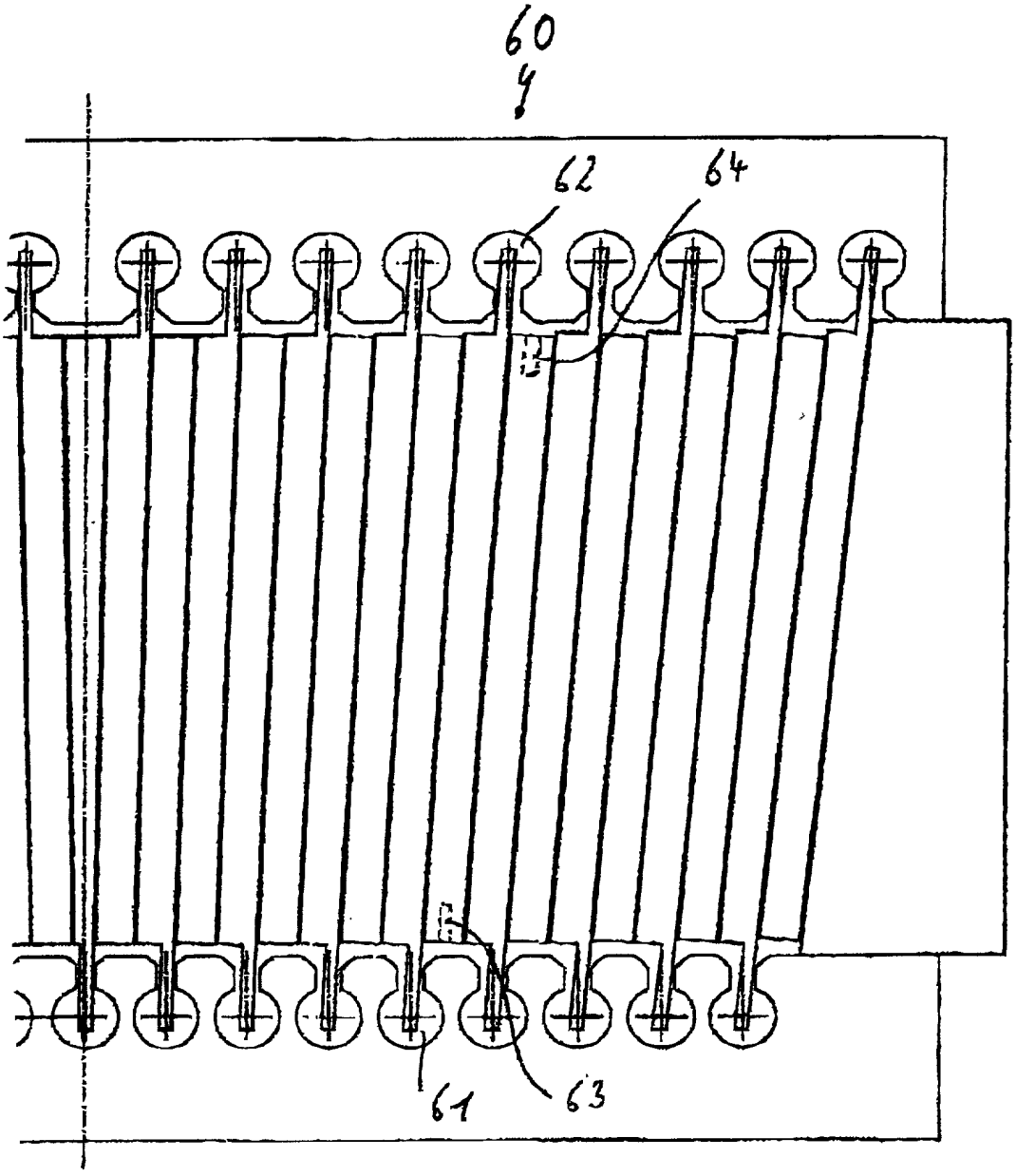

Fig 8

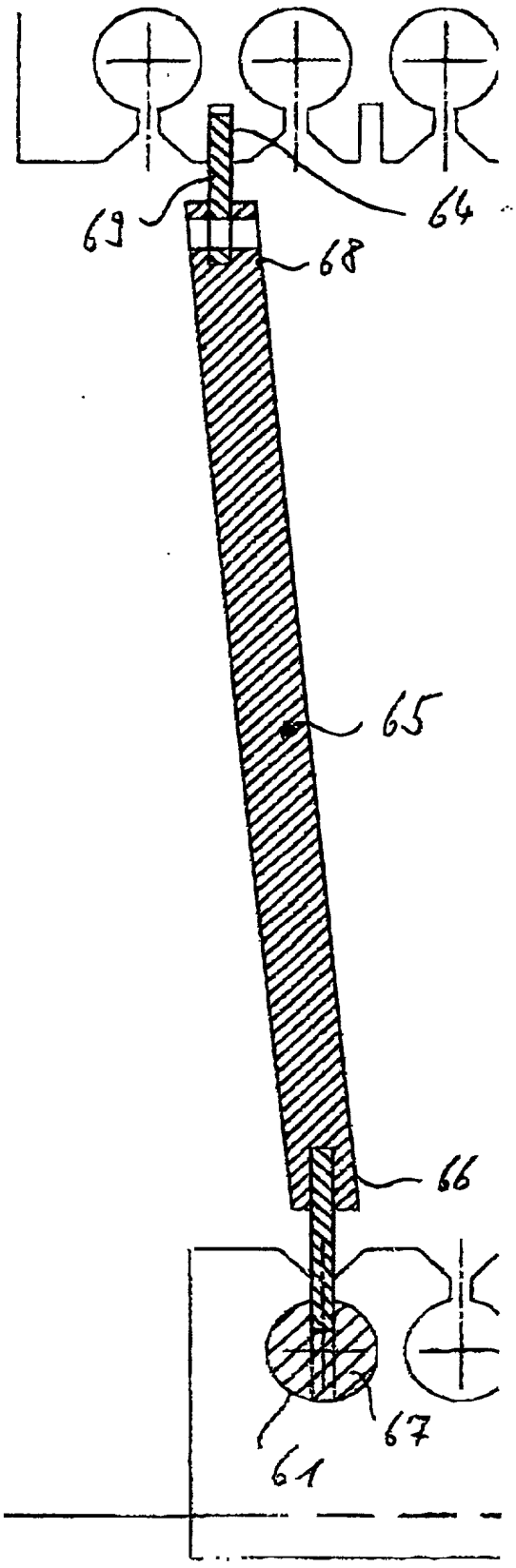

Fig. 9

PO 11340 US

PATENT APPLICATION

DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATION — **ATTORNEY DOCKET NO. 4139-121**

As a below named inventor, I hereby declare that:
My residence/post office address and citizenship are as stated below next to my name;
I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter, which is claimed and for which a patent is sought on the invention entitled:
CONTOUR COLLIMATOR FOR USE IN RADIOTHERAPY
the specification of which is attached hereto unless the following box is checked:

(X) was filed August 3, 2001 as US Application Serial No. 09/890,840 or PCT International Application Number _____ and was amended on _____ (if applicable).

I hereby state that I have reviewed and understood the contents of the above-identified specification, including the claims, as amended by any amendment(s) referred to above. I acknowledge the duty to disclose all information which is material to patentability as defined in 37 CFR 1.56.

Foreign Application(s) and/or Claim of Foreign Priority

I hereby claim foreign priority benefits under Title 35, United States Code Section 119(a-d) or 365(b) of any foreign application(s) for patent or inventor(s) certificate, or 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below any foreign application for patent or inventor(s) certificate having a filing date before that of the application on which priority is claimed.

COUNTRY	APPLICATION NUMBER	DATE FILED	PRIORITY CLAIMED UNDER 35 U.S.C. 119
Germany	199 04 972.6	6 February 1999	YES: X NO:
PCT	PCT/DE00/00347	7 February 2000	YES: X NO:

Provisional Application

I hereby claim the benefit under Title 35, United States Code Section 119(e) of any United States provisional application(s) listed below:

U.S. Priority Claim

I hereby claim the benefit under Title 35, United States Code, Section 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code Section 112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, Section 1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application

APPLICATION SERIAL NUMBER	FILING DATE	STATUS(patented/pending/abandoned)

POWER OF ATTORNEY:

As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) listed below to prosecute this application and transact all business in the Patent and Trademark Office connected therewith.

Steven J. Hultquist, Reg. No. 28021 **Marianne Fuierer, Reg. No. 39983**

Send Correspondence to:	Direct Telephone Calls To:
Steven J. Hultquist **Intellectual Property/Technology Law** **P.O. Box 14329** **Research Triangle Park, NC 27709**	**Steven J. Hultquist** **(919) 419-9350**

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

100 **Full Name of Inventor:** Wolfgang Schlegel **Citizenship:** German

Residence: Bachstrasse 29, D-69121, Heidelberg, Germany DEX

Post Office Address: Same

Wolfgang Schlegel
Inventor's Signature

19.11.01
Date

DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATION (continued)

ATTORNEY DOCKET NO. 4139-121

2-00

Full Name of Inventor: Otto Pastyr Citizenship: German

Residence: Mannheimer Weg 6, D-69181 Leimen, Germany DEX

Post Office Address: Same

Inventor's Signature Date 2001/11/20

3-00

Full Name of Inventor: Gernot Echner Citizenship: German

Residence: Panoramastrasse 13, D-69257 Wiesenbach, Germany DEX

Post Office Address:

Inventor's Signature Date 2001/10/01

4-00

Full Name of Inventor: Karl-Heinz Hover Citizenship: German

Residence: Talblickstrasse 21, D-74889, Sinsheim, Germany DEX

Post Office Address:

Inventor's Signature Date 2001/11/18

5-00

Full Name of Inventor: Jurgen Richter Citizenship: German

Residence: Peter-Haupt-Strasse 58, ~~D-97340, Buren~~ Germany DEX 1-1 D-97080 Würzburg R-2001/09/15

Post Office Address:

Inventor's Signature Date 2001/09/15

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